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A CASE OF SYMPATHETIC NEURO-RETINITIS.

BY S. C. AYRES, M. D, CINCINNATI.

ANATOMICAL EXAMINATION OF THE ENUCLEATED EYE.

BY ADOLF ALT, M. D., ST. LOUIS.

W. W. B., 30, medium size, fair complexion, blue eye, not robust; farmer. Was first examined Jan. 27, 1887. He gave the following history: Two months ago, while chopping wood, a piece flew off and struck his left eye. Sight was lost at once. The eye was bandaged and cold applications were made. The wound healed promptly and he suffered but little pain from it. The wound extends from near the upper border of the cornea directly downward through the diameter of the cornea and fully 2''' into the sclera, cutting entirely through the ciliary body. Iris had prolapsed into wound in its entire length, and had become incarcerated. Corneal wound smooth. Tn Sclera white,no pain or irritation. V=shadows. The right eye has been sensitive to light ever since the accident, but he could see well

and could read until about ten days ago. At that time he had a bright luminous appearance before the eye, and since then vision has been very imperfect. Sclera white Tn. V=0.3. Pupil dilated ad max. by mydriatic. There is a circle of pigment points on the lens capsule,showing that he had had slight iritis. Optic disk is markedly swollen and the vessels are obscured at the periphery by exudation. The central portion of the disk appears very vascular, probably from engorgement of the capillaries. The tortuosity of the vessels extends far out into the retina. The ophthalmoscopic picture of neuro-retinitis is complete in every particular. While this condition presumably exists in every case of sympathetic inflammation, it is very seldom the good fortune of observers to see it in consequence of the turbidity of the media.

I decided not to enucleate the injured eye at once, but to subject him to some preliminary treatment. Four leeches were at once applied to the eye, and he was ordered hydrarg. by inunction. Four days later, December 31st, V=0.4. Inunction and rest continued. February 4, V=0.7. On this day I enucleated the injured eye. The ball was normal in size. Tn. Vitreus liquefied with the exception of a small portion adhering to the ciliary body. Retina not detached, but in situ. The optic disk presented a swollen appearance similar to that of the right eye. Exudations covered the vessels at the periphery of the disk.

He remained at the hospital until February 14, when he returned home. Vision at that time slightly better than 0.7, but not quite 0.8. He could read Sn. 2 at 10″. He had occasional flashes of light in the eye, but his vision remained good all the time.

ANATOMICAL EXAMINATION.

When the eyeball reached me it was cut through the equator into an anterior and a posterior half.

The posterior half showed a well-marked protuberance of the optic papilla. The vitreous body was almost totally removed.

The anterior half showed a rectangular scar in the cornea, the longer portion of which passed almost through the center of this membrane and ended in the corneo-scleral region where the ciliary body was also injured. To this scar in the cornea the iris was glued by an interposed tissue to which the remains of the vitreous body also adhered. The crystalline lens was gone.

The points of interest in this eye are, of course, the optic papilla, the optic nerve, and its surroundings, of which I made a series of sections, of which some were stained with hæmatoxyline-eosine, some with carmine and picrine-carmine, while a large number were stained with aniline colors according to the methods of Weigert and Gram in order to study the bacterial side of the question.

The optic papilla showed even macroscopically a considerable swelling, and some folds were visible on the outer surface of the retina near the papilla, just as we find them in neuro-retinitis albuminurica. The intervaginal space seemed somewhat wider than usual. The piece of the optic nerve, measured from the level of the choroid (when hardened), was $8^1/_2$ mm. long. The funnel-shaped line marking the change from medullated into non-medullated nerve-fibres, as I have described it elsewhere, was plainly that of a hypermetropic eye (antero-posterior axis 22 mm.).

Microscopically the swelling of the optic papilla was found to be due to hyperæmia of the blood-vessels, especially the smaller ones, to emigrated and newly-formed cells, and an œdematous condition of the whole nerve-fibre tissue. The round cells are arranged around the blood-vessels in such a manner as to form a perfect sheath around them, many leucocytes are found in the act of emigration. Furthermore, each trabecule of connective tissue is well marked by a large number of round cells lying within it. The physiological excavation of the papilla is very small; the tissue near it and the connective tissue meniscus (Kuhnt) are especially infiltrated with round cells.

The connective tissue trabecules are easily traced backwards

through the lamina cribrosa into the optic nerve by the large quantity of round cells contained within them. The nerve fibres seem to be simply compressed. The small blood vessels are here also hyperæmic, but neither they nor the central retinal artery and vein are accompanied by a very marked quantity of emigrated leucocytes. Within the substance of the optic nerve the round cells seem to lie almost exclusively within the connective tissue. The lymphatic space accompanying the central retinal vessels which, according to Gifford's experiments, I had thought I should probably find filled with round cells, contained none to speak of.

The inter-vaginal space contains nothing. The dura mater-sheath seems to be unaltered as well as the orbital tissue adhering to it. In the pia mater sheath, however, no blood-vessel is visible, that is not surrounded by a large quantity of leucocytes. In consequence this sheath is somewhat broader than it is in the normal condition.

The retina, for about the distance of half the diameter of the optic papilla, is considerably swollen, the swelling gradually tapering off towards the periphery. There is little blood in its blood-vessels, but each and every one of them is surrounded by several layers of round cells, this condition being even more marked here than it is in the tissue of the papilla itself. On its outer surface the retina shows some folds, or rather indentations in such a manner, that on both sides of a portion of about normal thickness and arrangement of the layers, this arrangement is changed by a considerable stretching of the outer molecular and fibrous (Henle) layer. Thus this layer appears to consist chiefly of fibres running at right angles to the surfaces of the retina interspersed with a few round cells. This arrangement is, as stated above, very similar to the condition we find in albuminuric neuro-r initis. The whole of the optic papilla is broader than normal and the folds in the retina appear as being caused by the fact, that this membrane was pushed towards its periphery.

The whole of the choroid is thicker than normal. Its blood-vessels are partially filled with blood, partially empty. Some

show sclerosis and hyaline degeneration of the walls. The swelling of the tissue is not uniform, in some portions there are nodular prominences. This increase in thickness is due to the infiltration of the whole of the tissue of the choroid with round cells. Where the nodular swellings are seen, these round cells are more numerous, closer packed together, and appear almost like tubercles, or microscopical abscesses. In some places the choroid is firmly adherent to the sclerotic, no interposed new-formed tissue being visible, however. The stellated pigmented cells are partially destroyed.

The sclerotic also contains a great many round cells. They are found especially, however, in its inner layers, and surround each and every blood-vessel, that can be seen within it. This latter condition is in striking contrast with that of the ciliary nerves, which appear in no way altered, and are accompanied by very few round cells, except where they are lying close to a blood-vessel.

In the anterior part of the eyeball the portion of especial interest was that of the scar. Yet, it did not show anything especially remarkable. The scar-tissue and its surroundings are very vascular and here, as in all the other tissues of the eyeball, the blood-vessels are surrounded by a large number of emigrated leucocytes. The pupillary edge of the iris is glued to the scar in the cornea by means of an interposed new-formed tissue. The tissue of the iris contains numerous round cells, and some of its blood-vessels are covered with leucocytes, but, strange to say, the process of inflammation, or at least infiltration, is here less vigorous than in the choroid.

Where the remains of the vitreous body are attached to this new-formed tissue, they contain small accumulations of round cells here and there.

Where the sclerotic and the ciliary body had been injured, they are firmly glued together by a very dense scar-tissue. The iris-angle is obliterated. From the processus ciliares a cyclitic membrane is spreading inward, which contains remnants of a recent hæmorrhage. The sclerotic in this neighborhood is very vascular, and the blood-vessels are all surrounded by a

thick layer of emigrated leucocytes. The condition of the ciliary body is very similar to that of the iris. The infiltration with round cells is somewhat more general than it is in the iris, but less than in the choroid. The blood-vessels, especially in the inner portion, of the ciliary body are surrounded by round cells, and here and there a tubercle-like, dense aggregation of round cells is found. Similar accumulations of round cells are seen within the remnants of the vitreous body, which adhere to the ciliary body, but are otherwise seemingly normal.

The result of the staining of a great many sections by the methods of Weigert and Gram, with almost a fervent wish of being able to detect micro-organisms, was absolutely nil. Patient and careful searching by myself and others was equally unsuccessful.

When, by the kindness of Dr. Ayres, this eyeball was offered to me for microscopical examination, I had the hope that, from the clinical history of the case, it might prove to be especially valuable in eliciting several points. If here we had, as I expected, an injured eye suffering from neuro-retinitis solely, and having produced a sympathetic neuro-retinitis in the fellow, the transmission of the disease from one eye to the other by way of the optic nerve, was all but proven, —if any constitutional or other cause for the double neuro-retinitis could be excluded. This would have been the more probable, since the secondarily affected eye recovered after the enucleation of the first affected, injured eye. If it was further on possible to trace the presence of micro-organisms in the whole or part of the tissues of the injured eye, especially in the optic nerve, its sheaths or the inter-vaginal space, the theory of Leber and Deutschmann, that sympathetic ophthalmia was a septic disease, would have gained considerably in probability. No easier and more plausible explanation of this vexatious affection could be given, it seems to me: yet, one stumbling block, even if the bacterial origin of the disease was proven beyond a doubt, has always remained in my mind, and that is, why should the removal of the injured eye have any, and es-

pecially a curative, effect on the secondarily affected eye. If the second eye is affected on account of bacteria having wandered into it, by whatever route, how can the removal of the eye in which they were first lodged, change their pathogenic action in the second eye?

Yet the eye under consideration failed to clear up the two points which I had hoped it would throw a clear light on. It shows not only a well-marked neuro-retinitis, but all its structures without exception are inflamed. The inflammative process is much more vigorous and prominent in the posterior portion of the eyeball than in the anterior injured one. With regard to the bacterial origin of the disease, my examination proves, as stated, negative, my being not able to find any micro-organisms anywhere.

The histological conditions of this eye are, however, valuable in some other respects. The neuro-retinitis in this eye was undoubtedly much more violent than is usually the case, according to my own experience, in eyes suffering from an inflammation of the whole of the uveal tract, and approaches closely to what we see in albuminuric neuro-retinitis. The inflammatory process in the nerve itself is confined to the connective tissue and it is most marked in the pia mater sheath of the nerve. The intra-vaginal space shows nothing pathological, and the inflammatory symptoms in the dura mater sheath amount to almost nothing. These conditions, which are so striking that a mistake seems impossible, go, I think, a good way towards proving the conclusions of Knies, made from the examination of the case of serous iritis, and which I have so far not been able to concur in, namely: "That the sympathetic inflammation travels from one eye to the other *along the optic nerve and its pia mater sheath* by way of the chiasma."

This fact seems just at present to be the more important, since but very recently H. Gifford has published a paper in the *Archives of Ophthalmology* (September, 1886), in which he described a new theory of the transmission of the disease from one eye to the other, based on experiments made by infecting one eye with the bacillus anthracis. In a previous paper on

the direction of the lymph-streams in the eye (June, 1886), he had summed up with the following conclusions, which are important in this connection:

1. There is a decided current flowing *from the vitreus out through the central canal.* This does not empty into the intervaginal space, but leaves the nerve and passes into the cranial cavity along the orbital vessels.

2. The current in the intervaginal space flows *from the brain towards the eye,* as shown by Quincke (confirmed by Deutschmann.) This current passes *not into the nerve nor papilla,* but into the suprachoroidal space, and with the posterior vitreous stream, into the orbit. It is not improbable that there is also a certain amount of passage directly through the dural sheath, but the clefts are too fine to permit the ready passage of pigment granules or bacilli.

3. In the nerve itself the current is, in the transverse channels, towards the choroid and intervaginal space, in the longitudinal channels, towards the brain, at least for some millimetres back of the eyeball.

The new theory of transmission, above referred to, given by the same author, is given in the following sentences concluding his paper (September, 1886):

"Granting that sympathetic ophthalmia is an infectious disease, I am far from supposing that the foregoing settles the path taken by the micro-organisms in man. I merely assert that in rabbits the most direct and open path from one eye to the other, and that taken by the anthrax bacilli, lies not in the substance of the nerves themselves, nor in their sheaths, but leaves the first optic nerve with the vessels, passes through the orbit into the cranial cavity and thence via the subvaginal to the suprachoroidal space of the second eye. That the same course may be followed in man is certainly worth taking into consideration."

How do the conditions in the eye under consideration agree with these experimental experiences? In so far very badly, that it was impossible to find any micro-organisms. Moreover, the histological signs of inflammation, the emigration of

leucocytes from the blood-vessels and the infiltration of the surrounding portions of the tissues of the optic nerve are most striking near the physiological excavation, where the nerve fibres pass the choroid in front of the lamina cribrosa, and in the pia mater sheath. The main central retinal blood-vessels within the central canal of the optic nerve and their surroundings show hardly any evidence of emigration. If, therefore, in spite of my failure to find any micro-organisms in this eye, sympathetic ophthalmia is a septic disease, this would go to prove, that either the lymph-stream is not the same in man as it is in cats and rabbits, or that not all micro organisms travel by means of the lymph-streams along the blood-vessels. It is, however, as already stated, a confirmation of the views of Knies, that the inflammatory process travels along the pia mater sheath of the optic nerve.

It is noteworthy that in the eye under consideration neither the nerve-tissue proper of the optic nerve, nor of the ciliary nerves showed any marked histological changes, and that the inflammatory process seems all over to be confined to the blood-vessels and the connective tissue.

If sympathetic inflammation travels from one eye to the other by means of a *materia peccans*, it seems hardly possible that it could travel by any other way than by the nerve substance or its pia mater sheath, and Gifford's explanation, why the septic material having entered the cranial cavity (probably through the sphenoid fissure), should not produce any marked brain symptoms, while it will be able to destroy the fellow-eye, does not seem to me to be very satisfactory. He thinks it is due to the fact that no accumulation of micro-organisms takes place in the cranial cavity sufficiently large to do any mischief, while it will take place in the intervaginal and suprachoroidal space of the fellow-eye, where the micro-organisms are continually thrown by the lymph-stream. This would be, I think, much more plausible, if the micro-organisms travelled along in the pia mater sheath or within the substance of the nerve itself.

There is, however, one more point worthy of mention in this case, which might, perhaps, be considered apt to support an-

other statement made by Gifford. He says: 'As the fungi are carried down from the cranium between the sheaths of the first as well as the second eye, the former is subjected to a double infection, but as it is generally pretty thoroughly disorganized by the primary inflammation; this is generally of little importance."

As stated above, the inflammatory symptoms in the eye under consideration were considerably more vigorous in the posterior than in the anterior portions of the eyeball, in such a manner, that the inflammation seemed to increase the nearer the optic nerve entrance, and was of a high degree in the nerve itself. Yet in this connection I will state, that optic neuritis may often be found almost as an immediate result of an injury to the eye and at a time when this second infection could as yet not possibly have taken place.

CYST OF THE IRIS.

BY JOHN CHASE, M. D., DENVER, COL.

On September 20, 1886, Mrs. F., a stenographer, æt. 38, consulted me for a trouble of the left eye. She gave the following history: When four years old, a fork was run into her eye by a playmate; the eye was sore for a few days, and then seemed to recover completely. Up to two years ago she has always been able to read for a few moments at a time. Until 1878 she never had sufficient trouble with her eye to consult a physician. She remembers that the pupil was "cat eye" shape. In January, 1878, it began paining her, growing worse very rapidly, and through sympathetic action affecting the sound eye. In the latter part of the same month she consulted Dr. Knapp, who advised immediate operation to save the fellow eye. The patient does not know what operation Dr. Knapp performed, but says that her eye improved so that in a few weeks she resumed work, and had no further trouble with the injured eye until 1884, six years after the operation. She was told while in New York, that a subsequent operation might be necessary. In 1884 she was working in Iowa, and her eye again paining her, she consulted some local oculist. At this time her vision was ($^{20}/_{IX}$) in the injured eye, and ($^{20}/_{XX}$) in the sound eye. She submitted to an operation at this time, but cannot tell what it was. She says, however, that she had no further pain until the middle of last summer, shortly before coming to me.

When I first saw her the eyes were in the following condition:

The right eye, normal in every respect; she was having pain in the left eye, and over the left orbit. After working for a few moments, the pain in the left eye would always increase. The lens was cataractous; the iris presented the appearance of

having had two iridectomies, one directly downward, the other at an angle of forty-five degrees upward and inward. There was no cicatrix of the cornea. On the inner segment of the iris between the iridectomies, there was a small cyst, about the size of a kernel of wheat. The tension of the eye was normal. I postponed operating for a time, in order to watch the progress of the cyst. The patient consulted me about September 28, and there had been no perceptible change in the cyst. I did not see her again for about a week, and at that time the cyst had increased three-fold. Tension of the eye was + 1, and she was unable to use the eyes for work. The right eye at this time was also affected slightly, through sympathy. I advised immediate operation, and the day following, on October 7, I removed the cyst, and the entire segment of the iris, which had been left between the two previous iridectomies. A corneal incision was made with a Graefe's cataract knife. The cyst extended to the periphery, and of course, the entire portion of the iris had to be removed. The operation was made under cocaine. The straining of the patient when the iris was seized, caused the loss of a small portion of vitreus, the corneal tissue was soft, and offered very little resistance to the knife. The iris also tore very easily, and great care was needed to secure every portion of the cyst. The operation was followed by some hæmorrhage; all debris was removed and the eye bandaged after the usual manner. The patient was ordered to remain in bed for two days in a partially darkened room and the eye dressed twice a day. The corneal wound was well closed at the end of the second day, except a small portion of a line in extent: this did not become permanently closed for ten days, but effectually recovered under the use of boracic acid. Up to the present time, three months after the operation, there has been no return of the cyst and the patient has been able to resume work.

ON DIPHTHERIA OF THE CONJUNCTIVA.

BY ADOLF ALT, M. D.

Diphtheritic conjunctivitis or diphtheria of the conjunctiva, being a comparatively rare disease on this continent, it may, perhaps, be welcome to our readers to have a synopsis of a small number of cases which I have had the occasion to see and treat in a six years private practice in this city. I have seen a few more cases in hospital and dispensary practice, but have no record of them.

The cases I can report are the following:

CASE I.—K. G., 10 months old. When first seen the child had had sore eyes for about a week, but the left eye had become very considerably swollen and could not be opened for two days. I found a blennorrhœal discharge from the right eye with moderate swelling of the lids and conjunctiva. The left eye was swollen to a much higher degree, and, as usual, the upper lid more especially. On attempting to turn this lid, I found it impossible. The patient crying out, at every touch of it, I put her under chloroform, but even then I could just see that the inner surface of this lid was covered with a thick grayish-yellow membrane. There was hardly any discharge there. The cornea was slightly hazy, on the lower lid there was an immoveable patch of the same exudation toward the nasal side. The diagnosis being diphtheritic conjunctivitis, I ordered iced compresses and instillations of atropia. Three days later the exuded material began to get loosened at the edges; but only on the fifth day could I turn the upper lid and remove most of the membrane. Considerable hæmorrhage followed, but stopped upon the application of nitrate of silver. I now applied this remedy daily and in the course of two weeks the healing took place, with a small leucoma of the cornea in its upper outer aspect. There was no diphtheria in the neighborhood at the

time, nor did the child have diphtheria of any other mucous membrane.

Case II.—T. St., 14 months old. The history of this case is almost identical with that of Case No. I. The process lasted three weeks, but the eyes escaped serious injury; only a small leucoma of the right cornea remained behind. There was no diphtheria in the neighborhood at the time, and the child had no diphtheria of any other mucous membrane. The diphtheritic conjunctivitis concerned both eyes and especially the upper lids.

Case. III.—L. St., two and a half years old, sister of Case II, was noticed to have swollen eyes five days after her brother. Only a small patch of exudation was found on the right, and two on the left conjunctiva of the lower lids. In this case I began at once to treat the lids with nitrate of silver, and in two days the exudation came off, leaving small ulcers behind, and in four more days they healed. Two more children of the same family had a slight attack of catarrhal conjunctivitis at the same time.

Case IV.—J. F., eighteen months old, was brought to see me three days after an enormous swelling of the right eye had occurred. There was a slight muco-purulent discharge from this eye. The upper lid was dark, red and hard, and it was impossible to evert it properly, yet sufficiently so, to see the characteristic exudation on the conjunctiva. I saw this child only once more. It was taken with diphtheria of the throat and died a few days after. This child came from a neighborhood in which a number of cases of diphtheria occured at the time.

Case V.–VI.—To these two cases I was called in consultation by the physician, who had treated the children on account of diphtheria of the throat with very considerable gangrene and suppuration of lymphatic glands. The day before calling me, the doctor had noticed a soreness of the eyes with swelling and grayish exudation of the conjunctivæ. He had at once applied a one per cent. solution of nitrate of silver and ordered cold compresses. I saw the children early next morning.

L. E. two years old, had the characteristic exudation on the conjunctivcal surface of all the four lids and both the corneæ were sloughed and the irides were bare.

A.E., five years old, had also the characteristic exudation covering the conjunctival surfaces of all the four lids. The cornea of the right eye was partially sloughed, that of the left eye was perfectly clear. The general condition of this child was such, that death was continually expected, while the totally blind one was apparently more likely to recover.

Warm applications and instillations of atropia dissolved in a four per cent. solution of boracic acid were employed. The children both gradually recovered from the disease. The one was blind, the other had at least one perfectly good eye. The exudation was beginning to disappear from the conjunctivæ four days after it had been first noticed.

Case VII.—M. S., thirty years old, worked in a chemical factory and was employed making bromide of ammonium. To this he attributed his eye trouble. He had had red eyes for about a week, when, four days before I saw him, the right eye had become very much swollen and painful to the touch. I found the whole of the conjunctiva of the upper and the lower lids changed into a thick, whitish, yellow membrane, somewhat loose at the edges and easily bleeding there. The whole of the cornea was steamy. Ice, cocaine and atropine afforded some comfort; but when three days after the diphtheritic exudation began to be cast off, the cornea also was broken through and most of it sloughed off during the following days.

Although I had cautioned the patient to protect his left eye from infection as far as possible, I noticed swelling and chemosis of this eye, five days after I had first seen him. On turning the upper lid a patch of diphtheritic exudation was found in the middle portion of it. I at once treated this eye with nitrate of silver and continued ice applications and had a four per cent. solution of boracic acid instilled. The diphtheritic exudation did not extend much farther, yet several points of infiltration appeared in the cornea, near the corneo-scleral margin and upward, which after a few days formed small ulcers,

but healed gently. It took, however, three weeks before the swelling and discharge were perfectly gone. The right eye was then shrunken.

CASE VIII.—E. K., four years old, apparently in excellent health, was operated by me upon her left eye by tenotomy for convergent strabimus on October 2, 1886. The same night she was taken with fever and delirium, the next day there was considerable swelling of the lids and chemosis of the conjunctiva of this eye. The site of the wound looked grayish infiltrated. I at once had a four per cent. solution of boracic acid instilled every few minutes and iced compresses applied. The next day the swelling was worse, and there was a characteristic diphtheritic exudation occupying the site of the wound and its neighborhood. The child was very tenderly cared for by day and night, and finally on the fourth day the diphtheritic membrane came away leaving an ulcer behind, which, however healed rapidly and without serious consequences.

CASE IX.—T. S., æt. fifteen months, was brought to my office on account of an enormous swelling of the right upper lid, which had made its appearance the day before with febrile symptoms. He came from a neighborhood in which diphtheria was raging at the time and had had a sore throat some weeks previously, although this was not of a noticeably diphtheritic character, according to the statement of his physician.

I found the upper lid of the right eye enormously swollen, elongated over the lower lid and purplish red. There was a scanty discharge along the free edge. The merest touch of the lid caused the child to scream. After having tried in vain several times to evert the lid, I finally succeeded and I found the inner surface of this lid a yellowish white mass which was immoveable. The cornea I could not see. I ordered cold compresses and instillations of a solution of the bichloride of mercury of $^1/_{2500}$ every half hour, and a solution of atropia and cocaine in a 4% solution of boracic acid to be instilled every three hours.

To my astonishment, the membrane began to dissolve the

next morning, and the second day after having instituted this treatment, the whole of the membrane was gone, leaving a swollen conjunctiva behind, which bled freely and was denuded of its epithelium and suppurating. The swelling and pain were so great that it was not until the next day that I could get a good view of the cornea. It was hazy throughout in its superficial layers. The same treatment was kept up, gradually lessening the applications and instillations. The lid affection healed gently; but the infiltration of the cornea was perfectly gone only on the twelfth day, after I had seen the child first. He is now perfectly well, and has an absolutely clear cornea.

REMARKS.

In the first volume of his Archives of Ophthalmology, von Graefe gave one of his masterly descriptions of the diphtheritic conjunctivitis, of which he then had treated 48 cases. To the description of the appearance of this affection nothing can be added. In speaking of the nature of the disease, von Graefe gave the following as his opinion:

1. Diphtheria is *not* a local disease; it is, on the contrary, a systemic disease, and in this way it differs from blenorrhœa.

2. Its main causes are of an epidemic character.

3. With regard to the predisposition according to age, we may state genuine diphtheria is never found in the newly born. * * * Genuine diphtheria is observed in rare cases (1 out of 48) towards the end of the first year; it is considerably more frequent (4 among 48) in the first half of the second year. It is most frequently found in the second half of the second and during the third year (23 out of 48). Then it gradually disappears (12 cases from the third to the eighth year) and only 8 cases were seen after the eighth year, and these only at the height of an epidemic.

4. The conjunctival diphtheria is decidedly contagious, and it is so from its first moment of appearance until all secretion has ceased.

With regard to the prognosis, he calls it by far the most dangerous ophthalmia; and he further says that the prognosis

is even worse in the adult than it is in children. In support of this view he gives the following figures: Of 40 children 9 died; in 3 an adherent leucoma was the result; in 21 no corneal complication occurred; in the remaining 7 the corneal affection was of little importance. Of 8 adults, 3 lost the cornea by sloughing; in 2 the cornea was perforated and iridectomy had to be performed later on; the remaining 3 also had affections of the cornea, but in the later stages of the disease, and which were apparently of little importance.

He further states that the earlier the cornea becomes affected, the worse it is.

These experiences of von Graefe, made more than thirty years ago, have not in any material way been corrected by the more modern observers.

Hirschberg distinguishes between three forms of conjunctival diphtheria, viz.:

1. Circumscribed partial diphtheria, where we find a few separate islets of a yellowish-white hue in the diffusely-swollen and stiff mucous membrane, no matter whether they lie in the tarsal or in the intermarginal portion, or in the fornix. They are, however, usually found near the lid-margin.

2. Confluent diphtheria, where these islets are larger and coalesce, thus forming irregular plaques which occupy a considerable portion of the conjunctiva ($^1/_4$ to $^1/_3$), yet are more prominently found in the fornix. In this form the swelling and stiffness of the conjunctiva, even of the portions which appear red, are considerably increased.

3. Diffuse diphtheria in which the whole or almost the whole of the conjunctival sac is infiltrated whitish yellow, and the swelling and all other symptoms are of the most pronounced kind.

Saemisch distinguishes simply between a partial and a total diphtheria of the conjunctiva.

Most authors speak of the stage of diphtheritic exudation as the first; of the stage of purulent discharge as the second, and of the stage of scar-formation, as the third one.

Saemisch states that the disease is not only found as an epidemic, but also as a sporadic one.

It is, furthermore, well established that the disease is more frequent in certain countries, and even in certain portions of these, than in others. Northern Germany, and especially Berlin, seem to be the region of predilection of the disease.

It seems surely not to be a frequent disease in America, yet it is here and in Canada too, seen in the epidemic and in the sporadic form. In the epidemic form it is chiefly observed in dispensary practice, and while I was assistant at the New York Ophthalmic and Oral Institute, I had occasion to see several epidemics within two years. In a clinical report of this institute I had occasion to report 16 cases seen in one year.

With regard to the etiology nothing satisfactory is as yet ascertained.

From my own observations it seems to me that contrary to von Graefe's opinion and that of many others, the occasional occurrence of a local diphtheritic process on the conjunctiva without combination with diphtheritic processes elsewhere and without a general disturbance, rather indicates that diphtheria is not necessarily and always from the beginning a systemic disease; although the fact, that it may become one, is not to be denied.

With regard to the treatment, the rule laid down by von Graefe and most authors is not to use any caustic treatment until the blenorrhoic stage is reached. Before this, ice applications or hot applications, according to the indications in the case on hand, are to be made. Some recent authors advise the instillation of a quinine solution, of carbolic acid, or corrosive sublimate solutions, the inspergation of iodoform, and other antiseptic measures.

If we now review the nine cases reported above, one point is at once evident that, with the exception of case VII, they all concerned children. They were nearly all sporadic cases of conjunctival diphtheria, although most of them were observed at a time when diphtheria faucium was very prevalent in certain districts of this city. In two cases (VII and VIII) the predisposing cause was known. In case VII the eyes had been for months exposed to the vapors of bromine, while in

case VIII an operation was performed and followed by the in fection.

The result in the nine cases was the following: One (case IV) a child of eighteen months, died; four corneæ in these patients (cases V, VI and VII) sloughed; in two cases (cases I and II) a small leucoma of the cornea was all the damage done; the remaining eight eyes in six patients got well altogether.

As will be seen from the report, I treated the lids which came under my observation when the diphtheritic membrane was not yet large, or during its development, at once with nitrate of silver, thinking that the coagulation of the albuminous masses would act virtually in an antiseptic sense. The results were in the main satisfactory. The quickest and best result, however, was obtained in case IX, in which a continued antisepsis was kept up by the instillations of corrosive sublimate and boracic acid. In this case I have not used nitrate of silver, nor any other caustic or astringent, but had the instillations of antiseptics also kept up throughout the blenorrhoic stage. The result was so gratifying that I shall try it again, as soon as opportunity is offered.

TRANSLATION.

In the January, 1887, number of the *Klinische Monatsblätter f. Augenheilkunde*, J. R. DaGama Pinto makes a preliminary communication on the subject of *The Treatment of the Prolapse of the Iris in Corneal Ulcers*, of which the following is a translation:

The opinions of oculists are, as is well known, divided with regard to the treatment of the prolapse of the iris. While some would not touch the prolapsed iris and allow it to shrink and heal spontaneously, others try to shorten the process of healing by an early abscision, or by repeated slitting. In both cases an anterior synechia must result which may later on give rise to serious troubles. Aside from the irritation, the increase of tension, etc., which might be avoided or remedied by an iridectomy, an anterior synechia of the iris, since it is never sufficiently protected by the corneal scar, may allow of the entrance of infectious material into the eye, and may thus endanger it, even after several years have elapsed. It is well known that old anterior synechiæ are prone to inflame repeatedly, and that in some cases they have given rise to destructive purulent inflammations of the iris and of the vitreous body (Swanzy, Leber).

The rational treatment, therefore, should aim at the healing of any prolapse of the iris without the formation of an anterior synechia. We may sometimes succeed in this by the careful use of eserine or atropine. Yet, of this we will speak later on. If, however, this treatment does not succeed, or, if this mode of treatment does not promise success from the beginning, we must try to gain the wished-for result by operative means. Such an attempt I made in the following case:

Joseph J., æt. 21, was admitted to the Heidelberg University Clinic on August 9 on account of a recent perforation of the

left cornea, after this eye had been diseased for a fortnight. The eye is intensely red and painful. There is a prolapse of the iris, $1^1/_2$ to 2 mm. high, lying between the middle and the outer margin of the cornea; the pupil is drawn towards the temporal side, the anterior chamber shallow. Since the usual treatment with eserine and iodoform bandage was unsuccessful, I proceeded on the third day to operate on the eye. After the patient was anæsthetized with chloroform, I grasped the prolapsed piece of iris with a sharp hook-forceps, pulled it a few times to and fro, and cut it off with scissors after having carefully severed it from all its corneal adhesions by means of a probe. The result was a regular coloboma of the iris with free corners. Next morning the anterior chamber was re-established; it was, however, reopened under the protective bandage without any known cause on the fourth day after. The iodoform powder which I had dusted into the conjunctival sac after the operation had been collected in the opening of the cornea so as to form a sort of stopper. As I was of the opinion that this iodoform stopper might act as a foreign body and be an obstacle to the reparation of the loss of substance, I decided to remove it after having waited for seven days in vain. Really, three days after I had done so, the anterior chamber was again re-established, the eyeball became paler, and soon the patient could go about without a bandage. But one day, just as I thought of discharging the patient from the clinic, I suddenly found the anterior chamber empty again. It was now plain that the scar was not firm enough and at some occasion had yielded to the intra-ocular pressure. Again, treating the eye with a bandage and rest in bed, I finally succeeded in producing a durable healing. When the patient was discharged on September 26 his vision was $^6/_{IX}$.

From this observation I would like to call attention to the following interesting points:

1. It is possible to cut off a fresh prolapse of the iris in such a manner as to leave no anterior synechia behind.

2. Iodoform, so frequently made use of as an antiseptic, may

prove a mechanical obstacle to the closure of the corneal perforation.

3. Whenever the opening in the cornea, after having been freed from the prolapsed iris, is comparatively large, the formation of the scar and its consolidation may be accomplished but very slowly.

This last disadvantage of the operative procedure, I had made use of, led me to consider whether, after having cut off the prolapse of the iris, it might not be possible to cover the opening in the cornea by some living tissue, and in this manner not only to obtain a prompt closure, but also artificially to procure some material for a more rapid and firm scar-formation. It appeared to be the nearest thing to use a flap of conjunctival tissue without pedicle for this closure.

Very soon after I had occasion to execute this idea successfully.

On September 3, Frieda M., æt. 9, was admitted to the clinic. The right cornea showed down- and inwards a roundish, deep ulcer, apparently of a phlyctænular nature, which was treated with eserine, warm applications for an hour at the time, and iodoform bandage. During the night from the 7th to the 8th of September perforation of the cornea took place, accompanied by a prolapse of the iris, 2 mm. in height. I removed the latter in the manner above described, and I covered the loss of substance in the cornea by means of a flap without pedicle taken from the conjunctiva bulbi of the same eye. On account of the shrinking which was to be expected, I took the flap about twice as large as the opening I wanted to cover, laid it with its raw side on the cornea, and pressed it into the opening with a probe. No iodoform. Compressive bandage over both eyes.

On the third day, when the bandage was changed for the first time, the anterior chamber was found to be re-established and deep. The transplanted piece of conjunctiva adhered firmly, was very vascular, and its center protruded somewhat. From this on nothing remarkable occurred. The anterior chamber remained closed permanently, the protrusion and vas-

cularization of the flaps disappeared gradually, and on October 25 the child was discharged with an eye free from all irritation. We had kept the child on purpose in the clinic for such a lengthy period, in order to be able to observe the further fate of the transplanted piece of conjunctiva. It was healed on so perfectly, that not even a line of separation between it and the surrounding tissue of the cornea could be made out.

The second case was that of a girl, æt. 16, and was operated upon by my colleague, Dr. Bernheimer, during my absence. The patient was scrofulous to a high degree and had a deep, ulcer in the lower inner quadrant of the right cornea; its fundus was covered by pus and the surrounding corneal tissue was deeply infiltrated. It looked like a case of mycotic keratitis,and we refrained from treating it with the galvano-cautery simply on account of its dangerous depth. On the third day perforation of the cornea and prolapse of the iris occurred. After the latter had been cut off, the ulcer was covered with a flap of conjunctiva. Two days after a part of the anterior chamber was re-established and the flap seemed to be firmly adherent. On the fifth day, however, it came off; yet, this did not in the least interfere with the formation of the scar, which process was then already going on nicely. The cause for the unsuccessful transplantation was probably the impure and infiltrated condition of the fundus of the ulcer, which was probably ill fit to afford the transplanted tissue the necessary nutritive material. Of course, it is not impossible that there may have been other agencies at work, which future observation may develop. Certain it seems to be, that the conjunctival cover, by acting as a sort of protective bandage, had a favorable influence on the process of scar-formation.

The third case, which has been observed but very shortly, was operated upon by Professor O. Becker. A young man, æt. 20, whose cornea bore the signs of former inflammations in the shape of a number of nubeculæ, had three ulcers on the left cornea,oneof which was deep and had a gray fundus.On the third day this last ulcer led to perforation, and a very small prolapse of iris. As instillations of eserine did not affect the prolapse

in any way, it was cut off on the fourth day, and some conjunctival tissue transplanted upon it. It was, however, in this case impossible to loosen all adhesions of the iris to the cornea, and thus the coloboma partially adhered to the cornea. The result in all other respects was as satisfactory as in the first case. The anterior chamber was closed rapidly, and the flaps healed on so perfectly that to-day (seventeen days after the transplantation) it can be recognized only by the aid of a magnifying glass.

These few but decisive facts are apt to induce further investigations. After a longer experience only and with more accurate observations we will be able to come to well-founded conclusions in what kind of cases it will be possible to make a successful transplantation of the conjunctiva. The method adopted is here shortly described.

When the prolapse is not too old, it is grasped with a hook-forceps, drawn forward and from one side to the other, and, after having been freed from all adhesions with the cornea by means of a probe, it is cut off with a clip of the scissors. Then a fold of conjunctiva of the desired size is removed from the sclerotic of the same eye, laid on the opening with its raw surface and pressed slightly into it by means of a blunt probe. A compressive bandage is then applied to both eyes, which is not to be changed until the third day. On account of the shrinkage which will occur, the flaps must be made one and a half time or twice as large as the loss of substance to be covered. The conjunctival wound may be left alone, or it can be stitched together with catgut. Since it is especially important to remove the prolapse carefully and to adapt the transplanted flaps exactly, the chloroform anæsthesia is decidedly preferable to that of cocaine.

It is not unlikely that this operation may also prove useful in fistula of the cornea, and in obstinate hernia of Descemet's membrane. In such cases the region of the fistula or hernia would have to be removed by means of a trephine before the transplantation is performed.

I must not omit to mention that the merit of having first

transplanted flaps without pedicle from the conjunctiva unto the cornea belongs to Professor Kuhnt, of Jena. He tried to transplant a piece of conjunctiva without pedicle in a case of central but unperforated ulcer with success, in which the loss of substance could not be covered by a pediculated flap (Schöler-Kuhnt method). The patient died on the seventh day, and the microscopical examination proved the union of the flap with the corneal tissue.

It will be perceived, however, that the indications as well as the conditions for the healing are very different in our operation from those in this case of Kuhnt.

In conclusion, I desire to make a few remarks on the non-operative treatment of prolapse of the iris. It is well known that prolapse of the iris may heal without the formation of an anterior synechia. I can, however, nowhere find exact statements as to the kind of cases in which such a healing might with some probability be expected to take place, and I would like, therefore, to give my experiences with regard to this point. The prolapsed piece of iris may appear in two forms: Either it protrudes like a pouch, or it has the shape of a cone with its apex forward. If the opening in the cornea is comparatively small and the intra-ocular pressure in the moment of perforation is pretty strong, the iris must be thrown forward with a certain force, made to bulge by the aqueous humour and be strangulated within the perforated cornea. In this manner the first form of prolapse occurs which I have never yet seen to heal without synechia. In such cases the operation would be indicated from the beginning. When, however, the loss of substance in the cornea is comparatively large, the prolapsed iris must necessarily take on the shape of a cone, in a more or less pronounced manner, and will protrude but slightly (? Translator); since in such cases there is not enough iris tissue to make a pouch which might become strangulated. This form of prolapse can sometimes after the corneal defect is repaired, retract perfectly. Instillations of eserine or atropine, according to the situation of the perforation, may in such cases be of good service when combined with a compressive bandage.

Such a perfect healing is rather frequent in children, while in the adult it is very rare, probably because in the latter the iris is more apt to become inflamed, and the corneal defect less apt to heal. In this way adhesions between both membranes will take place at an early stage, and the formation of an anterior synechia is unavoidable.

The following is the translation of an article by Chibret in the *Archives d' Ophtalmologie* on "*A Simple Mode of Treating Panophthalmitis.*

The use of antiseptic methods has almost caused the disappearance of the violent forms of panophthalmitis which we used to observe after cataract extractions. In spite of that, however, such cases of panophthalmitis as yet present themselves often enough to us as the results of neglected injuries to the eye.

The patients come to us with an enormously swollen eye, extreme pains, and all symptoms of a deeply-seated suppuration with constriction. Making an opening will, by favoring the evacuation of the pus which is formed, give ease, but the suppurative process goes on for many days yet.

The enucleation, as well as the exenteration, shoot beyond the mark, and since at least one of these two operations is not without danger, it seems to me they should both be shunned.

For two years I have systematically made use of the antiseptic method in suppurative inflammation of the eyeball and in eight cases I have operated as follows:

1. A large incision into the cornea, forming an inferior flap as for the extraction of a cataract, discission of the capsule and extraction of the lens. The pus flows out.

2. When the fluid pus has stopped running off, I search for the thick and adherent pus by means of a pair of iridectomy forceps; injections of a solution of corrosive sublimate into the vitreous body are made alternating with the manœuvres made with the forceps. I extract in this manner shreds of semi-purulent vitreous, and do not stop until I am satisfied that there is no longer any trace of suppurating tissue within

the walls of the eyeball. An injection which returns clear and the appearance of healthy vitreous body are the signs which allow us to assume, that we have not left any suppurating portions behind. A last intra-ocular injection of corrosive sublimate (1 in 2,000) ends the operation; a compressive bandage is applied to the eye, and for some months I have added a permanent collyrium of cocaine and iodoform, as I have recently recommended.[1]

The result is a marvellous quietude which follows immediately after the operation. Fever and pain disappear in twenty-four hours.

For the following two days it is well to renew at every change of the bandage the sublimate injection, and on the third day the patient may be allowed to go home, with the suppuration stopped and the eye on the way to recovery. If I compare this result with those reached by an expectative treatment or by a simple opening, by the enucleation or exenteration, I do not think it useless to publish this simple method which is free from danger and more rapid in its good effects than anyone of those which are now being employed.

The following is taken from the *Centralblatt fuer Praktische Augenheilkunde* and is an extract from a paper by Jegorow

[1]The "permanent collyria" recommended by the author in the June number of the *Revue Clinique d' Oculistique*, 1886, are described by the author in he following way.

I take a thin elliptic layer of cotton, 20 by 15 mm., and put on it an ointment having for base vaseline and white wax and containing iodoform and cocaine, or any other alkaloid. The cotton is folded over this ointment so as to enclose it, and the whole is introduced into the lower conjunctival cul-de-sac by means of a probe.

The permanent collyrium remains in the bandaged eye two or three days, and the quantity of cocaine is sufficient to insure a deep anæsthesia for twelve hours. It contains some cocaine yet, after having lodged in the cul-de-sac for forty-eight hours. The iodoform is absorbed, and iodine is found in the urine after forty-eight hours. The iodoform acts as an anæsthetic as well as an antiseptic. * * *

* * * These permanent collyria are very well borne by the eye, and hasten the cicatrization after the operations. This action is due to the hypotonic condition induced by the cocaine and to the influence of the iodoform upon the old or recent wounds.

(which appeared in the *Archives fuer Physiologie*) *On the Influence of the Long Ciliary Nerves on the Dilatation of the Pupil.*

The experiments were made on dogs and cats under the supervision of Dogiel, and led to the following results.

All dilating nerves enter the eyeball near the optic nerve entrance without having joined the ganglion ciliare. After section of all long ciliary nerves the pupil contracts, but remains regular in shape. If then the cervical portion of the sympathetic nerve is cut, the pupil does not contract any further, nor does electric irritation of the peripheral stump of the sympathetic or of the central stump of any sensory nerve cause dilatation of the pupil. If not all of the long ciliary nerves were cut through, the pupil contracts also, but its shape is irregular, just as is the case (according to Voelcker and Hensen), when the short ciliary nerves are irritated. If, now, the cervical portion of the sympathetic be cut through, the pupil becomes still further contracted and its shape more regular. If then, the peripheral stump of the sympathetic is irritated, or the central stump of a sensory nerve, the pupil becomes dilated, it appears, however, now more irregular in shape than before. Irritation of isolated peripheral stumps of the long ciliary nerves will cause the pupil to dilate; this result will appear more promptly by the branch which perforates the upper portion of the musculus retractor bulbi than by means of the long ciliary nerves which accompany the optic nerve. This branch goes to the upper and outer segment of the iris, its irritation; therefore, causes a dilation of the upper and outer portion of the pupil.

It is proven by these experiments that the pupil-dilating nerves leave the ganglion Gasseri with the first branch of the trigeminus nerve, and go, without passing through the ganglion ciliare, by way of the long ciliare nerve, directly to the iris.

CORRESPONDENCE.

DEAR MR. EDITOR.—The accompanying cut of my *spool advancement needle* was recently received from Tiemann with the request that an account of it be given to some medical journal for publication.

Its necessity first became evident about six years ago. In attempting to correct an internal strabismus of moderate degree, the capsule of Tenon was sufficiently lacerated to allow the tendon to retreat so much as to occasion an extreme external squint, decidedly worse than the original deformity.

Stimulated by the prospect of disgrace, I extemporized a hook, after drawing the temper of a surgical needle, and fortunately succeeded in advancing the retracted muscle, which was then secured to its proper place with a perfect cosmetic result.

A study of this case developed the operation of "advance-

FIG. 5.

ment of the rectus," together with the capsule and conjunctiva published in the *St. Louis Medical and Surgical Journal*, June, 1881, and in Noyes, Diseases of the Eye, p. 116. The operation was improved by a *pulley modification*, which appeared in the *New York Medical Record*, August 8, 1885, with a cut of the needle then in use after the manner of the cork-screw-staphyloraphy needle.

The antiseptic importance of keeping the thread from touching the face, hair or clothing together with the realization of its extensive usefulness in canthoplasty and other operations on the conjunctiva led to the conception, that it merited a spool in the handle, to carry antiseptic silk, shielded from contact with pyogenic organisms.

This requirement was met in August, 1885 by the introduction of a bobbin (Fig. a.) to carry about thirty feet of silk—which issues from a very small opening in the shield and passes through the eye of the needle (b) to be caught by toothed forceps—after the tissues have been transfixed.

The loop suture for advancement is made by transfixing the rectus a second time from within outward, catching the thread and withdrawing the needle before cutting it off. The thread for the anterior fixation point (pulley) should be entered one or two mm. from the cornea, slightly into the dense tissue, which purpose is better served by the sharpness and delicacy of Tiemann's No. 25 eye needle. This thread is then tied to encircle one branch of the loop suture in a form of pulley over which it is drawn to any degree of tightness, and tied with a surgical bow-knot, to be modified or made secure after an interval, when a perfect position shall have been established. The silk which has been employed is Tiemann's iron-dyed No. 2. It is first soaked in a $^1/_{10}\%$ sublimate solution, dried, waxed (to prevent untwisting), and treated with iodoform in vaseline 3% when, wound on the spool, it is always ready for use.

Very respectfully,

A. E. Prince.

Jacksonville, Ills.

REVIEWS.

A Treatise on Simple and Compound Ophthalmic Lenses, their Refraction and Dioptric Formulæ. Including Tables of Crossed Cylinders and their Sphero-cylindrical Equivalents. By Chas F. Prentice. Published by James Prentice & Son, New York.

This little book we highly recommend on account of its clear style and the simple way in which it explains the subjects it deals with. The author says in the preface that he hopes through graphical and analytical means to guide the reader upon a path by which he may gain easy access to an understanding of the subject without recourse to mathemati-

cal dioptrics, and we think that he has succeeded admirably. The numerous illustrations are of the best, and even the novice, to whom the book is addressed, will be able to comprehend all the intricacies of the subject.

We personally regret that the author uses the terms *dioptric*, the original one *dioptry*, appearing to us also the more correct one, as we have already stated at other occasions.

This little work should have a large circulation. ALT.

SKIZZENBUCH ZUR EINZEICHNUNG OPHTHALMOSCOPISCHER BEOBACHTUNGEN DES AUGENHINTERGRUNDES. Von Dr. O. Haab, Docent der Augenheilkunde in Zürich.

Haab's Ophthalmoscopic Sketch-book is meant to simplify the representation of ophthalmoscopic conditions, and it does this so successfully that it should receive a hearty welcome from those who, with neither training nor talent for the use of water colors, often feel keenly the lack of ability to obtain any thing like an accurate copy of rare conditions of the fundus.

The essential part of the book is a series of plates with red back ground of the fundus already laid on. By means of a peculiar rubber this red can be partially or wholly removed so as to give every variation between the original red and a pure white; and with the aid of a black lead-pencil and two shades of red crayon, nearly all the variations of color which the normal and pathological fundus reveal can be reproduced with remarkable accuracy. No adequate idea of the advantage of this erasable red background can be given by a description; practically, it enables one to do in a few minute what an unskilled hand would either be unable to do at all, or would require hours by ordinary methods.

The author in his preface urges very properly the advantages of making drawings of the fundus, not only in extraordinary cases, but in all cases of active disease of the fundus where it is important to keep accurate accounts of the changes for better or worse.

The book is published in English and German, and can be had in New York City of G. A. Stechert, 766 Broadway, and of Steiger & Co. G. (Omaha).